

Upon disestablishment of NRDL in 1969, an extensive decontamination effort was begun to reduce all radioactivity to federally regulated levels for unrestricted use. The Atomic Energy Commission (AEC) performed confirmation surveys and determined the residual levels to be below AEC requirements in February 1970.

In 1978, the Navy prior to releasing the buildings for leasing, conducted additional surveys of Buildings 815, 816 and 364. Some residual areas of contamination were found and decontaminated in 1979. The Nuclear Regulatory Commission (NRC) reviewed the surveys of building 815, 816 and 364 and concluded they met the guidelines for unrestricted use in 1980.

In 1991, Hunters Point Annex was listed on the BRAC II list. Radiation surveys and sampling of soil, surface material, and air at radiation sites were performed in conjunction with the radiation investigation at Hunters Point Annex (HPA) which began in 1991. These surveys and sampling, which are being performed in four phases, are still ongoing.

Phase I of the investigation (known as the Surface Confirmation Radiation Survey, SCRS) was conducted from 1991 to 1992 to confirm the presence of a surface radiation anomaly detected in 1990 that was thought to result from radium-containing instruments buried in the Industrial Landfill (IR-01/21) and Industrial Bay Fill Area (IR-02) in Parcel E. In addition, soil was monitored in the Submarine Base Area and Waste Oil Disposal Area in Parcel B, to investigate the source of elevated levels of radium-226, and sampling of asphalt and concrete was performed at an area near Building 364 in Parcel D which was used for subsurface containment of low-level radioactive waste. Elevated gamma radioactivity levels were identified at these sites.

The 1992 SCRS identified more than 300 near-surface point sources in soil within an area of approximately 400 feet by 250 feet at the IR-02 landfill site, along with three such sources in near-surface soils at the IR-01 site, and recommended that subsurface conditions at these sites be investigated.

During Phase I, high-volume air sampling was also performed at and in the investigated sites to verify that airborne alpha and beta radioactivity levels did not exceed health and safety limits. Analysis of the air sample filters for gross alpha and beta radioactivity indicated that levels were within the range of ambient or normally background levels.

In 1993, additional soil sampling was performed at Parcel E to determine if the Industrial Bay Fill Area can be considered for remediation. Soil samples were submitted to the U.S. Environmental Protection Agency's National Air and Radiation Environmental Laboratory (NAREL) for study and analysis by gamma spectrometry. EPA concluded that, while certain areas of the site contain elevated concentrations of radium-226, its levels and distribution in other areas suggest that a significant volume of the site could potentially be remediated by selective soil removal and separation.

Phase II of the investigation was performed in 1994 to implement SCRS recommendations to investigate subsurface conditions in areas where elevated gamma radioactivity was detected. Monitoring results from test pits and trenches dug at the Parcel E landfill sites, IR-01 and IR-02, led to the discovery of 111 radium-containing items (from scattered radium dials) within approximately 5500 cubic yards of soil at the Industrial Bay Fill Area. No subsurface gamma anomalies were detected in the Industrial Landfill. The monitored sites in Parcel B (Submarine Base Area and Waste Oil Disposal Area) contained only naturally-occurring radioactivity and the asphalt near Building 364 contained cesium-137, which was disposed of off-site. Phase II concluded that the data collected during the SCRS and the trenching data provide adequate characterization of type and subsurface extent of radium-containing materials and the volume of soil that may require remediation within the Industrial Bay Fill Area. It recommended that no further radiation investigations be performed for soils in the Submarine Base Area and Waste Oil Disposal Area since soil analysis established that radioactivity in soil at these sites is due to naturally occurring minerals and is not the result of waste disposal.

Phase III of the investigation was conducted in 1997 to address concerns regarding the use, storage, and disposal of radioactive material during past NRDL operations at HPA. Gamma surveys and soil sampling were performed at numerous sites, along with asphalt, concrete, and wipe sampling at the concrete pad near Building 707.

The following information and reasons for sites included in the Phase III investigation:

- Building 351A: Pipe drains in a work room had not been fully investigated.
- Building 506 and the Building 364 sump site: concerns about past spills of radiological materials.
- Buildings 507, 508, 509, 510, 510A, 517, and 529: concerns about residual contamination from past operations.
- Building 707 concrete pad site: lack of previous survey data.
- Lack of proper building and site release documentation (no specific site mentioned).

The following conclusions and recommendations from the Phase III investigation:

- Buildings 351A, 507, 508, 510, and 510A may be considered for release by the Navy for unrestricted public use.
- Buildings 506, 509, 529, 517, the low-level radioactive waste storage site near Building 364, and the concrete pad near Building 707 do not qualify for release and further remediation is underway. These sites are expected to be released upon completion of this work.

For sites not recommended for release, the following information was presented in Phase III Report:

Sump near Building 364 (Parcel D): Strontium-90 exceeded acceptable levels on the wall of a sump located outside the building and cesium-137 exceeded acceptable levels on the wall of an associated utility trench. The sump site had been used for storage of low-level radioactive waste.

Site of Buildings 506 and 529 (Parcel E): A potential buried point source was detected behind the site of Building 529. Since the buildings were approximately 15 feet apart, their former locations were combined as one survey site, referred to as the Building 529 site.

Site of Buildings 509 and 517 (Parcel E): An anomalous radiation reading was measured during a gamma survey. Since these buildings were joined, their former locations were combined as one survey site, referred to as the Building 509 site.

Pad near Building 707 (Parcel E): A concrete pad on the west side of the building was used by NRDL to store drums of radioactive waste prior to their shipment to an off-site disposal facility. Samples of the pad and surrounding area exhibited levels of cesium-137, radium-226, thorium-228, and thorium-232 above acceptable levels.

The Phase III radiation investigation recommended the excavation of the potential buried point source behind Building 529 and the area around the anomalous count reading near Building 509. Further study was recommended for the Building 364 and Building 707 sites.

Phase IV was conducted in 1999 to quantify ambient concentrations of specific radionuclides and further characterize radiation sites outside Buildings 364 and 707. The goal of Phase IV was to determine whether specific areas adjacent to Buildings 364 and 707 were available for radiological free release and industrial reuse. Phase IV reports that the primary radioactive contaminant of concern at the Building 364 site during sampling was cesium-137, while at the Building 707 concrete pad site, americium-241, cobalt-60, europium-152, europium-154, and uranium-235 were present at levels above background. The Navy made the following determinations:

- At the Building 364 site, no samples contained cesium-137 at levels exceeding derived concentration guideline levels (DCGL) and that the human health risk (using the Residual Radiation (RESRAD) model and the DTSC basic radiation dose of 25 millirem per year) was within the acceptable risk range. In addition, the average asphalt/concrete and soil concentrations of cesium-137 did not exceed the EPA-corrected PRG, although three samples did exceed the EPA-corrected PRG.
- At the Building 707 concrete pad site, cesium-137 was the only radionuclide for which sample concentrations exceeded the DCGL. The human health risk at this site was within the EPA's acceptable risk range. The average asphalt/concrete and soil concentrations of cesium-137 exceeded the EPA-corrected PRG. Maximum concentrations of americium-241, europium-152, europium-154, and uranium-235 exceeded the decay-corrected PRGs, but the average concentrations of these radionuclides did not exceed the decay-corrected PRGs.

The Phase IV radiation investigation recommended the removal of the Building 364 cesium-137 spill site and the Building 707 concrete pad to reduce the radiological contamination at these sites to levels consistent with decay-corrected PRGs.

Phase IV report states that the Navy is taking action to reduce potential risk to human health for full-time building occupants, maintenance or demolition workers, and future area residents. The radioactivity identified at the Building 364, 707, 529, and 509 sites will be reduced to levels or concentrations that meet or exceed (when practicable) the protectiveness criteria established by the EPA.

Work on above project began in January 2001, with the majority of the work being completed and awaiting results from final confirmation samples. This project identified other potential areas of concern, which will be investigated and/or remediated beginning in June 2001. The other areas include elevated levels on the wall of building 364, removal of a pipe stub from under building 364, investigate building 351A, investigate elevated levels at building 529 and building 707 pad, investigate drainage sumps and pipes at building 707 and remove sandblast grit.

Parcel E remediation is expected to include capping and removal of material in the Industrial Bay Fill Area (IR-02). Although the Industrial Landfill (IR-01/21) does not require remediation for radiological concerns, it is expected to be capped.

Table below lists HPA facilities and sites which have been associated with operations involving G-RAM. All buildings formerly used to support the NRDL program are included due to the radiological aspects of the program.

In the mid 1990's, the Navy began preparing the Historical Radiological Assessment of Hunters Point. This is divided into two parts, 1. Nuclear Propulsion Program and 2, the General Radioactive Material (G-RAM) operations. Part I, was issued in August 2000, and Part II draft is anticipated in approximately 90 days. The HRA will address the radiological operations at Hunters Point from both the shipyard and NRDL.

Sites Associated with Radiological Operations at Hunters Point Annex

| Site IRP No. (1) | Parcel | Historical Use (applicable to radiological operations) and Remarks |
|-------------------------------------|--------|---|
| Building 113 IR-42 | B | Analytical laboratory; radioactive material storage; salvage divers shop. (3) |
| Building 114 IR-42 | B | Formerly NRDL Building 113A. NDT Facility and site of radiography vault; analytical laboratory; radioactive material storage; waste disposal and storage (lead from Building 364); contained-area immediately south used for storage of radioactive gauges. (3) |
| Building 114 (original) IR-42 | B | Former NRDL office area. Demolished; building number assigned to Building 113A. (2) |
| Building 130 IR-24 | B | Contained-area used for storage of potentially radioactive material. |
| Building 146 IR-23 | B | Industrial and photographic laboratory; radioactive waste disposal and radioactive check source storage; site of waste drum storage area. (3) |
| Building 214 IR-28 | C | Room 105 used as Health Physics office and counting room. (3) |
| Building 253 IR-28 | C | Former NRDL Annex K; Electronics, Optical, and Ordnance Shop. Calibration room on sixth floor; optical shop; used for repair of radium dials and decontamination of radioluminescent equipment removed from ships. (3) |
| Building 271 SI-74 | C | Former NRDL Paint Shop Annex. (2) |
| Building 274 IR-35 | D | Former NRDL site for decontamination training (using lanthanum-140). Used for storage of radioluminescent equipment removed from ships. (2) |
| Building 313 IR-35 | D | Former NRDL Annex G. Used for storage. Demolished. (2) |
| Building 313A IR-35 | D | Former NRDL Annex H. Used for storage. Demolished. (2) |
| Building 351 IR-34 | D | Former NRDL electronics shop. Used for reconditioning of radioluminescent-painted equipment. (3) |
| Building 352 IR-34 | D | Formerly Building 351A. Former NRDL Radiac repair facility and electronics laboratory. Used for reconditioning of radioluminescent-painted equipment. (3) |
| Building 364 IR-33 | D | Former NRDL site of radiological chemical research, containing holding tanks. Site includes Sump behind building used for radioactive effluent storage. (4) |
| Building 365 IR-33 | D | Former NRDL photographic film laboratory. (3) |
| Building 366 IR-34 | D | Formerly Building 351B. Former NRDL site of x-ray unit with radioactive sources. Used for reconditioning of radioluminescent-painted equipment. (3) |
| Building 414 IR-36 | D | Fenced low-level radioactive waste storage area containing drums with potentially radioactive material and a radioactive combination safe (removed and disposed of). |
| Building 506 IR-14 | E | Former NRDL chemistry laboratory and storage area for tritium targets for neutron generator. Demolished; site includes surrounding area. (4) |
| Building 507 IR-38 | E | Former NRDL biology laboratory. Demolished; site includes surrounding area. (3) |
| Building 508 IR-38 | E | Former NRDL Annex J. Used as Health Physics office. Demolished; site includes surrounding area. (3) |
| Building 509 IR-38 | E | Former NRDL Annex K. Used as animal irradiation laboratory. Demolished; site includes surrounding area. (4) |
| Building 510/510A | E | Former NRDL radiation physics laboratory. Demolished; site includes |

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| IR-14 | | surrounding area. (3) |
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Sites Associated with Radiological Operations at Hunters Point Annex
(Continued)

| Site IRP No. (1) | Parcel | Historical Use (applicable to radiological operations) and Remarks |
|---------------------------------|--------|---|
| Building 517 IR-70 | E | Former NRDL Annex D, located at the northeast end of Building 509; biomedical facility; cobalt-60 irradiation room. Demolished; site includes surrounding area. (4) |
| Building 520 IR-14 | E | Former NRDL Annex K (original use unknown). Demolished. (2) |
| Building 529 IR-14 | E | Former NRDL Annex K; radioisotope storage area; site of Cockroft-Walton Accelerator (tritium used as target). Demolished; site includes surrounding area. (4) |
| Building 707 IR-39 | E | Former NRDL animal colony; radioactive waste stored near building. Site includes surrounding area. (4) |
| Building 708 IR-39 | E | Former NRDL Annex K; biomedical facility. (2) |
| Building 815 IR-74 | E | Former NRDL main laboratory and headquarters. (3) |
| Building 816 SI-41 | E | Former NRDL laboratory with particle accelerator (tritium used as target). (3) |
| Building 820 IR-75 | E | Former NRDL radiation laboratory with cyclotron (not used). (2) |
| Building 821 | E | Former NRDL x-ray facility. (2) |
| Building 830 IR-76 | E | Former NRDL biology laboratory; used by University of California for radiological operations. (2) |
| Building 831 IR-76 | E | Former NRDL biology laboratory; used by University of California for radiological operations. (2) |
| Drydock 4 IR-57 | C | Possible accumulated radioactivity in drainage channels from service of ships. |
| Industrial Landfill IR-01/21 | E | Disposal of radioluminescent material and equipment in fenced area (no pending radiological remediation). |
| Industrial Bay Fill Area IR-02 | E | Disposal of radioluminescent material and equipment in Northwest and Central sections. (4) |
| Berth 2 | C | Accidental overboard release (and immediate recovery) in 1954 of drums containing radioactive waste (area surveyed by EPA in 1989). (3) |
| Area near Buildings 352 and 364 | D | Site of former cesium-137 spill (remediated) on portion of asphalt between buildings. (3) |
| Submarine Base Area IR-07 | B | Landfill site suspected of containing radioactive sandblast waste from Operation Crossroads decontamination operations. (3) |
| Waste Oil Disposal Area IR-18 | B | Landfill site suspected of containing radioactive sandblast waste from Operation Crossroads decontamination operations. (3) |
| Unspecified Drydocks | | NRDL Support; site of removal of radioluminescent equipment from ships for landfill disposal. |
| Unspecified Berths | | Site of removal of radioluminescent material and equipment from ships for landfill disposal. |

Notes: (1) IR and SI numbers are Installation Restoration Program site numbers.
(2) History of site use shows no potential for residual radioactive contamination.
(3) Site was surveyed and found to be free of radioactive contamination, and may be released for unrestricted use.
(4) Remediation pending.